

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Seiichiro HIGASHI

Application No.: New Rule 1.53(b) Divisional of Application No. 09/218,497

Filed: December 27, 2001

Docket No.: 038404.02

For: LIQUID CRYSTAL DISPLAY DEVICE, DRIVING METHOD FOR LIQUID
CRYSTAL DISPLAY DEVICES, AND INSPECTION METHOD FOR LIQUID
CRYSTAL DISPLAY DEVICES

PRELIMINARY AMENDMENT

Director of the U.S. Patent and Trademark Office
Washington, D. C. 20231

Sir:

Prior to initial examination, please amend the above-identified application as follows:

IN THE ABSTRACT:

Please replace the Abstract filed with the Substitute Abstract attached hereto.

IN THE SPECIFICATION:

Page 1, line 13, delete current heading and insert therefor:

BACKGROUND OF THE INVENTION

Page 1, lines 14-21, delete current paragraph and insert therefor:

In an active matrix liquid crystal display device using thin film transistors
(abbreviated as TFTs in the remainder of this document) as the switching elements, if it is
possible to form the active matrix driving circuits from TFTs and fabricate those TFTs at the
same time as the picture element (pixel) TFTs on the active matrix substrate, the need to
provide driver integrated circuits (ICs) is removed; and this is convenient.

Page 6, line 16, delete current heading and insert therefor:

BRIEF DESCRIPTION OF THE DRAWINGS

Page 6, lines 21-22, delete current paragraph and insert therefor:

Figure 2 is to explain the features of the example shown in Figures 1A-1B.

Page 7, lines 23-26, delete current paragraph and insert therefor:

Figure 12A shows the essential part of the liquid crystal display device of the present invention shown in Figures 1A through 3, and Figure 12B is a signal waveform showing the advantage of the circuit of Figure 12A.

Page 9, line 24, delete current heading and insert therefor:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Page 23, lines 15-17, delete current paragraph and insert therefor:

Figure 13A shows the configuration of the essential component of a fourth example of the present invention.

Page 24, line 25 to page 25, line 2, delete current paragraph and insert therefor:

As shown clearly in Figure 14, in order to stop the generation of pulses from the gate circuit during the horizontal blanking period (time t12 to t13), it is necessary to stop the operation clocks (CL1, nCL1) and the enable signals (n, nE) between times t1 and t4.

Page 25, lines 12-17, delete current paragraph and insert therefor:

In Figure 15, inspection signal input circuit 2000 is connected to one end of the data lines; and video signal input line S1 is connected to the other end of the data lines via analog switch 261. In Figure 15, TG represents the test enable signal; and TC represents the supply voltage.

REMARKS

Claims 1-21 are pending. By this Preliminary Amendment, the Abstract and specification are amended. No new matter is added. Prompt and favorable examination on the merits is respectfully requested.

The attached Appendix includes marked-up copies of each rewritten paragraph
(37 C.F.R. §1.121(b)(1)(iii)).

Respectfully submitted,



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Date: December 27, 2001

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ABSTRACT

Using technology which uses a single shift register and simultaneously generates multiple pulses, this invention is a liquid crystal display device which rapidly drives data lines. It is possible to increase the frequency of the shift register output signal without changing the frequency of the shift register operation clock. If the shift register output signals, by means of analog switches, are used to determine the video signal sampling timing, high speed data line driving can be realized. Additionally, if the output signals of the shift register mentioned above are used to determine the video signal latch timing in a digital driver, high speed latching of the video signal can be realized. Consequently, even if the driving circuits of the liquid crystal display matrix are composed of TFTs, high speed operation of the driving circuits is possible without increasing power consumption. The shift register can also be used to inspect the electrical characteristics of the data lines and analog switches.

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APPENDIX

Changes to Abstract:

The following is a marked-up version of the amended Abstract:

SummaryABSTRACT

Using technology which uses a single shift register and simultaneously generates multiple pulses, this invention is a liquid crystal display device which rapidly drives data lines._

———It is possible to increase the frequency of the shift register output signal without changing the frequency of the shift register operation clock. If the shift register output signals, by means of analog switches, are used to determine the video signal sampling timing, high speed data line driving can be realized._

———Additionally, if the output signals of the shift register mentioned above are used to determine the video signal latch timing in a digital driver, high speed latching of the video signal can be realized. Consequently, even if the driving circuits of the liquid crystal display matrix are composed of TFTs, high speed operation of the driving circuits is possible without increasing power consumption._

———The shift register can also be used to inspect the electrical characteristics of the data lines and analog switches.

Changes to Specification:

Page 1, line 13:

Background TechnologyBACKGROUND OF THE INVENTION

Page 1, lines 14-21:

In an active matrix liquid crystal display device using thin film transistors (abbreviated as TFTs in the remainder of this document) as the switching elements, if it is possible to form the active matrix driving circuits from TFTs and fabricate those TFTs at the same time as the picture element (pixel) TFTs on the active matrix substrate, the need to provide driver integrated circuits (ICs) is removed; and this is convenient.

Page 6, line 16:

Brief Explanation of the Figures

BRIEF DESCRIPTION OF THE DRAWINGS

Page 6, lines 21-22:

Figure 2 is to explain the features of the example shown in Figures 1A-1B.

Page 7, lines 23-26:

Figure 12A shows the essential part of the liquid crystal display device of the present invention shown in Figures 1A through 3, and Figure 12B is a signal waveform showing the advantage of the circuit of Figure 12A.

Page 9, line 24:

The Best Systems for Implementing the Invention

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Page 23, lines 15-17:

Figure 13A shows the configuration of the essential component of a fourth example of the present invention.

Page 24, line 25 to page 25, line 2:

As shown clearly in Figure 14, in order to stop the generation of pulses from the gate circuit during the horizontal blanking period (time t12 to t13), it is necessary to stop the operation clocks (CL1, nCL1) and the enable singles-signals (n, nE) between times t1 and t4.

Page 25, lines 12-17:

In Figure 15, inspection signal input circuit 2000 is connected to one end of the data lines; and video signal input line S1 is connected to the other end of the data lines via analog switch 261. In Figure 15, TG represents the test enable signal; and TC represents the supply voltage.